

Smoke Management

STRATEGIES
TECHNIQUES

LESSON OBJECTIVES:

- Understand that smoke and its constituents can be managed.
- Define/discuss the 3 principal smoke management strategies available.
- Describe the different tools/techniques within each strategy needed to prepare a Smoke Management Plan.

INTRODUCTION

- Smoke can be managed.
- Legislation requires a Smoke Management Plan (Sec. 10.1-1150.4).
- 3 Principal Strategies, each has several techniques available.

STRATEGIES

Page 9, Va Rx Guide

- Avoidance

- Dilution

- Emission
Reduction

AVOIDANCE STRATEGY

- Keep all smoke/emissions away from smoke sensitive areas.

AVOIDANCE

TO BURN OR NOT TO BURN?

- Is prescribed burning necessary, or are there other alternatives such as:

Mechanical

Bury/Landfill

Chemical

Increase Biomass Utilization

Grazing

AVOIDANCE

NO NEW SMOKE

- Schedule burns for conditions that make intrusions into smoke sensitive areas unlikely:
 - When wind is blowing away from sensitive areas
 - Avoid burning into late afternoon or nighttime
 - Burn on “strengthening” not “calming” winds
 - Burn units above stable air layer in mountains
 - Avoid weekend/holiday burning
 - Look for burn chances outside normal season

AVOIDANCE

SMOKE HAPPENS, CAN I SHUT IT OFF?

Have a contingency plan for shutting down operations safely and quickly if the unexpected happens

- Identify existing log roads, trails, etc. useful in shutting burn off
- Construct some additional internal lines
- Burn in small blocks
- Provide for engines to standby with water/foam
- Provide for dozer unit to standby
- Identify & notify available extra personnel
- Totally finish one burn block before moving to another block

Reduce Area Burned



Burn small units



Reduce Area Burned

----- Contingency Lines

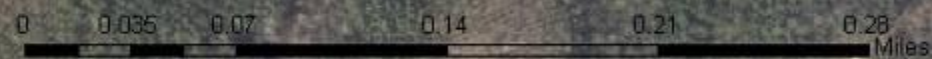
High School Unit A

Property Line

High School

65 Acres

High School Unit



Choose
appropriate
wind direction







DILUTION STRATEGY

- Mix a fixed amount of smoke/emissions throughout a larger volume of air.



Prescribe for nighttime dispersion

- overnight low $5^{\circ} >$ dew point
- $<80\%$ RH

DILUTION

IF YOU MUST POLLUTE, PLEASE DILUTE

- Good Ventilation = Good Dispersal
 - Burn during mid-day when ventilation typically improves and avoid burning late when ventilation deteriorates.
 - Stable atmosphere vs. unstable atmosphere
 - Pay attention to Mixing Heights and Transport Winds

DILUTION

SMALLER ACRES/SLOWER MATCHES

- Burn fewer and/or narrower strips at any one time.
 - Too slow a pace to ignition can cause operations to extend into poor dispersal period
- Burn smaller area during each burning period.
 - Subdividing larger burn units into several smaller ones to accommodate smoke management needs costs more.

DILUTION

TURN IF OFF, COME BACK LATER IF SMOKE
HAPPENS

- Have a contingency plan to suspend operations early and come back another time to put up the rest of your smoke.

EMISSION REDUCTION STRATEGY

- Reduce the quantity of smoke or emissions produced/unit area (e.g. reduce the tons/acre of PM2.5 produced).

EMISSION REDUCTION

TONNAGE AND TIMELAGS

- Focus on larger/heavier fuels and duff classes.
 - Reduce total fuel loading present on the site.
 - Reduce actual fuel load consumed during burn.

REDUCE FUEL LOADINGS

- Improve biomass utilization (e.g. low stumps, chipping)
- Isolate heavy fuel concentrations from ignition source
 - Interior control lines
 - Pre-treat with foam/water/retardant
- Is your duff burning?



Burn frequently



Increase Combustion Efficiency

Burn under dry conditions

- **Dry conditions lead to increased combustion efficiency and less emissions may be produced. However...**

Reduce Fuel Consumed

Burn before large fuels cure

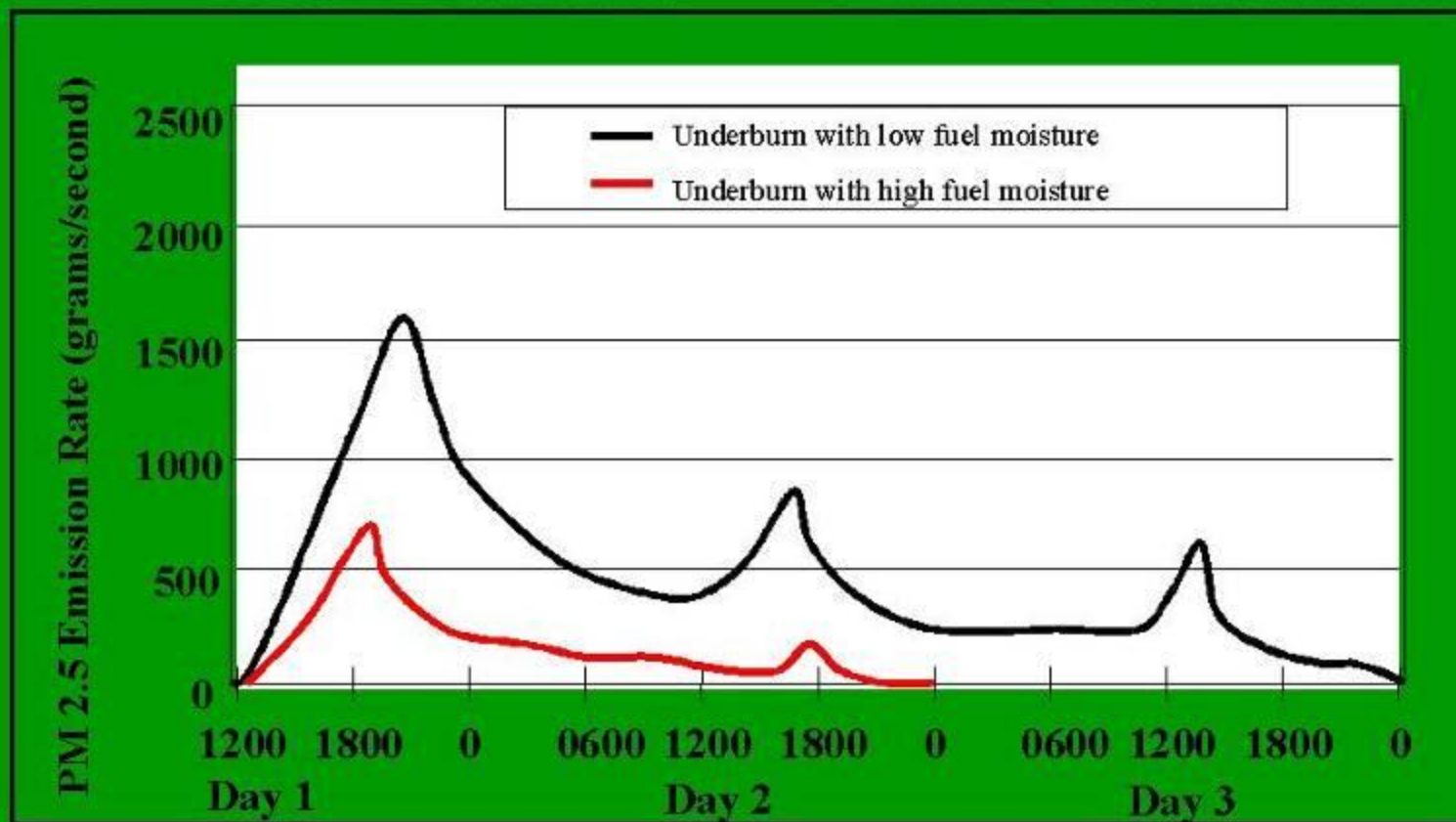
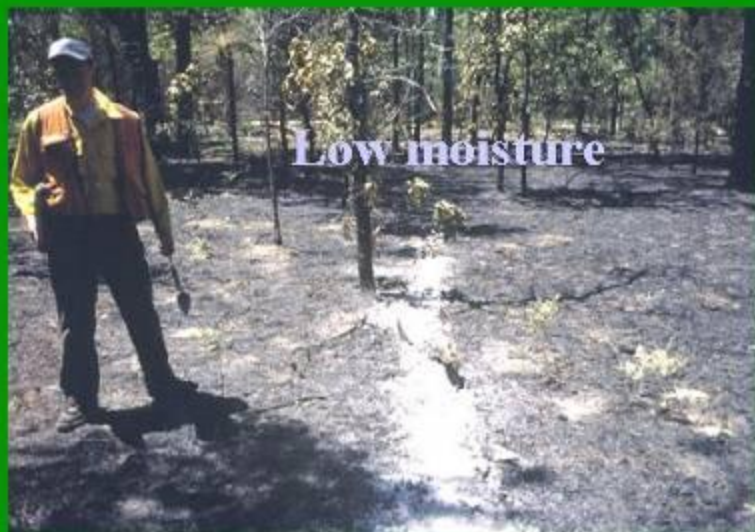
Reduce Fuel Consumed



Burn before precipitation

REDUCE CONSUMPTION

- Schedule burns when large fuel class moistures are too high to ignite or sustain combustion, yet finer fuels will burn (e.g. a low RH day 1-3 days after long duration “soaking” rain).
- Break up/scatter heavy fuel concentrations (change horizontal arrangement/continuity of large fuels).



EMISSION REDUCTION

- Favor flaming over smoldering combustion
 - Firing technique--backing fires/mass ignition
 - Keep dirt out of piles
 - Avoid burning heavy organic soils
 - Mop-up--prompt and thorough, get inside!

MINIMIZATION TECHNIQUES

- Have clear objectives (Sec. 10.1-1105).
- Obtain/use weather forecasts.
- Don't burn during stagnation advisories, inversions.
- Comply with regulations, including the local ones.
- Burn under good dispersion conditions.
- Notify Virginia Dept. of Forestry of burn.
- Notify local fire dept. dispatchers, adjacent landowners and other neighbors.
- Burn under favorable moisture conditions.

MINIMIZATION TECHNIQUES

- Use backing fire whenever you can, flanking too.
- Smaller areas.
- Mop-up.
- Have an emergency plan and implementation criteria.
- Shut it off, safe and fast.

PILE AND WINDROW POINTERS

- Allow large fuels to dry before concentrating into piles or windrows.
- Cover piles before rains start.
- Keep dirt out by using toothed (brush-rake) blades
- Round “haystack” piles burn more efficiently than windrows do. Pile it higher.

OTHER REFERENCES

- Guide for Prescribed Fire in Southern Forests, pp. 29-30, and 32 (Step 5).
- Prescribed Fire Smoke Management Guide, pp 12-15.
- Various web-sites (EPA Website-Interim Air Quality Policy on Wildland and Prescribed Fires)